Switch	Telephony Function	Switch Type	NNP Changes Required	Who incurs Cost	Magnitude S/M/L/XL	Who Benefits
Originating	Routing	Legacy Wireline (2-PIC)	ACQ[3] if feasible or downstream commercial arrangement; transport costs associated with reaching the IP network; adding IPLRN to all switch translations; CIC routing based on LRN;; ACQ requires LSMS data for all NPAC regions	All orig SPs who do not have ACQ already; all orig SPs; all orig SPs	L per switch; depending on IP capability and/or commercial agreements; S per switch	NNP SPs
Originating	Routing	VoIP	ACQ[3] if not already in use; Requires LSMS data for all NPAC regions	All orig SPs who do not have ACQ already	M per network	NNP SPs
Originating	Routing	Mobile	ACQ[3] if not already in use; Requires LSMS data	All orig SPs who do not have ACQ already	M per network segment	NNP SPs

Switch	Telephony Function	Switch Type	NNP Changes Required	Who incurs Cost	Magnitude S/M/L/XL	Who Benefits
			for all NPAC regions			
Originating	Routing	LNPA	Remove LATA edit prohibiting NNP	LNPA	N/A	NNP SPs
Originating	Rating	Legacy Wireline (LD Option)	LRN based rating[2];	Orig SPs with LD plans would enhance rating for NNP calls	L per network as calls that were previously rated as local now need to be rated as LD and Form 499[4] reporting	NNP SPs; Orig SPs might recover some costs for their NNP LD calls via the rate plan
Originating	Rating	Legacy Wireline (Local Option)	N/A	N/A	N/A	NNP SPs;
Originating	Rating	Legacy Wireline (2-PIC Option)	LRN based rating;	Orig SPs with LD plans would enhance rating for all calls	XL per network for rating and Form 499[4] reporting	NNP SPs; Orig SPs might recover some costs for their NNP LD calls via the rate plan

Switch	Telephony Function	Switch Type	NNP Changes Required	Who incurs Cost	Magnitude S/M/L/XL	Who Benefits
Originating	Rating	VoIP	LRN based rating if LD rate plan	All Orig SPs who do not currently do this	L per network for rating changes	NNP SPs
Originating	Routing	VoIP	Potentially no change dependent on architecture or solution	N/A	S if applicable.	NNP SPs; Originating switch only on NNP LD calls
Originating	Routing	Mobile	Potentially no change dependent on architecture or solution	N/A	S if applicable.	NNP SPs; Originating switch only on NNP LD calls
Originating	Billing	All types	No Change	N/A	N/A	NNP SPs; Originating switch only on NNP LD calls
Transit	Routing	RBOC Tandem	Routing changes to egress the TDM Network via IP. If not supported, IP-	Transit Carriers	M per tandem switch if RBOC tandem is responsible for TDM to	NNP SPs; Originating switch only on NNP LD calls

Switch	Telephony Function	Switch Type	NNP Changes Required	Who incurs Cost	Magnitude S/M/L/XL	Who Benefits
			capable tandem service providers can be leveraged to translate TDM to IP. An additional query for NNP calls would be required to identify the destination SIP URI as well as LSMS access to all NPAC regions		IP translation. No change if IXC has the obligation to support IP calls.	
Transit	Routing	VoIP Transit	A query for NNP calls would be required to identify the destination SIP URI as well as LSMS access to all NPAC regions. Routing would need to be modified to support sending calls via this method including	N/A	M per network.	N/A

Switch	Telephony Function	Switch Type	NNP Changes Required	Who incurs Cost	Magnitude S/M/L/XL	Who Benefits
			codec negotiation or other SIP required attributes.			
Transit	Routing	IXC LD Tandem	A query for NNP calls would be required to identify the destination SIP URI as well as LSMS access to all NPAC regions.	N/A	M per network.	NNP SPs; Originating switch only on NNP LD calls
Transit	Routing	MSC Gateway	N/A	N/A	N/A	N/A
Transit	Rating	RBOC Tandem	The ability to rate calls routing on IPLRNs.	RBOC Tandem	L per network.	NNP service providers.
Transit	Rating	VoIP Transit	N/A	N/A	N/A	N/A
Transit	Rating	IXC LD Tandem	The ability to rate calls routing on IPLRNs.	IXC LD Tandem	L per network	NNP Service Providers.
Transit	Rating	MSC Gateway	N/A	N/A	N/A	N/A

Switch	Telephony Function	Switch Type	NNP Changes Required	Who incurs Cost	Magnitude S/M/L/XL	Who Benefits
Transit	Billing	RBOC Tandem	N/A	N/A	N/A	N/A
Transit	Billing	VoIP Transit	N/A	N/A	N/A	N/A
Transit	Billing	IXC LD Tandem	N/A	N/A	N/A	N/A
Transit	Billing	MSC Gateway	N/A	N/A	N/A	N/A
Terminating	Provisioning	Legacy Wireline	Assumed not possible	N/A	N/A	N/A
Terminating	Provisioning	VoIP	SOA support for NPAC Voice URI and access to all NPAC regions	NNP SPs	S for SOA change; M for TN admin changes	NNP SPs
Terminating	Provisioning	Mobile	SOA support for NPAC Voice URI and access to all NPAC regions	NNP SPs	S for SOA change; M for TN admin changes	NNP SPs
Terminating	Provisioning	Mobile permanent roading	No Change	N/A	N/A	N/A
Terminating	Routing & Termination	Legacy Wireline	Assumed not possible	N/A	N/A	N/A

Switch	Telephony Function	Switch Type	NNP Changes Required	Who incurs Cost	Magnitude S/M/L/XL	Who Benefits
Terminating	Routing & Termination	VoIP	N/A	N/A	N/A	N/A
Terminating	Routing & Termination	Mobile	N/A	N/A	N/A	N/A
Terminating	Rating	Legacy Wireline	Assumed not possible if NNP TN not provisionable; Support rating for onward routing to NNP provider	Term SP (Code Holder[1])	M per network	NNP SP; Term SP if billing for onward routing
Terminating	Rating	VoIP	Support rating for onward routing to NNP provider	Term SP (Code Holder[1])	M per network	NNP SP: Term SP if billing for onward routing
Terminating	Rating	Mobile	Support rating for onward routing to NNP provider	Term SP (Code Holder[1])	M per network	NNP SP; Term SP if billing for onward routing
Terminating	Billing & Settlement	Legacy Wireline	Support billing upstream SP not using ACQ for NP query and NNP onward routing	Term SP (Code Holder[1])	M per network	NNP SP; Term SP if billing for onward routing

Switch	Telephony Function	Switch Type	NNP Changes Required	Who incurs Cost	Magnitude S/M/L/XL	Who Benefits
Terminating	Billing & Settlement	VoIP	Support billing upstream SP not using ACQ for NP query and NNP onward routing	Term SP (Code Holder[1])	M per network	Term SP if billing for onward routing
Terminating	Billing & Settlement	Mobile	Support billing upstream SP not using ACQ for NP query and NNP onward routing	Term SP (Code Holder[1])	M per network	Term SP if billing for onward routing

Notes

1. The use of a code holder for query and routing in exceptions where the query does not take place by the originating or transit switch would not be successful in conditions where the ported out number no longer resides in the original rate center, i.e. where the code holder likely does not have information necessary to route via originating subscriber's PIC. Thus, the appropriate CIC would be unavailable for the routing needed to transport the originating carriers call. This type of default routing should be avoided. Rather ACQ or query prior to the terminating network should be used.
2. Legacy wireline long distance charges may apply.
3. Originating switches lacking the capability for ACQ need to make arrangements for downstream NP queries in order to avoid call completion failures. It has not been determined that all TDM switches in use today are ACQ capable.
4. FCC Form 499 reporting requires additional NNP in order to continue providing separate statistics for intra and interstate calls.

Recommendation

The NNP Technical Sub-Committee has held numerous meetings to address the request from the FCC Wireline Competition Bureau to the NANC Chair, "... to investigate the technical requirements necessary to support NNP, and to provide more detailed cost/benefit analyses ..." of the proposed solutions. The team performed deep technically-focused reviews on the NLRN and NGLRN proposed solutions from the initial NNP group's report, the PTSC report, the detailed call flows, and discussions investigating impacts to TDM, wireless and VoIP applications.

Given the in-depth conversations focusing primarily on the technical feasibility of these two solutions, the team was unable to fully investigate the impacts of an NNP solution on interconnection, compensation, tariffs, and access charges. Because of this, many members were not in a position to select one proposal over the other. Readers are cautioned that due to time constraints this report does not address all aspects in the detail necessary for any conclusions to be made based on this report.

This sub-committee recommends that the impacts on interconnection, compensation, tariffs, and access charges be further investigated for the NLRN and IPLRN solutions.

Next Steps/Conclusion

An additional effort needs to be undertaken to study the impacts on interconnection, compensation, tariffs, and access charges.

APPENDIX A

Nationwide Number Portability Technical Subcommittee

Chair:

Somos

Mary Retka, Vice President for Industry Relations

Members:

AT&T Services, Inc.

Teresa Patton, Principal – Technology Solutions Manager

CenturyLink

Philip Linse, Director for Public Policy

Charter Communications, Inc.

Glenn Clepper, Director - Telephone Regulatory

Comcast Corporation

Beau Jordan, Director, Compliance Legal/Regulatory

Henning Schulzrinne, Professor

Telcordia Technologies, Inc. dba iconectiv

Chris Drake, Chief Technology Officer

T-Mobile USA, Inc.

Rosemary Leist, Sr. Numbering Policy Manager

Telnyx LLC

David Casem, CEO

APPENDIX B:

Nationwide Number Portability Technical Subcommittee

Co-Chair:

Courtney Neville, Associate General Counsel

Competitive Carriers Association

Co-Chair:

Richard Shockey, Chairman of the Board of Directors

SIP Forum

Voting Members:

Ben Aron, Director, State Regulatory and External Affairs

CTIA (Working Group Alternate)

Rebecca Beaton, Infrastructure Manager

Washington Utilities and Transportation Commission

Jerome Candelaria, Vice President and Counsel, Regulatory Affairs

California Cable & Telecommunications Association

NCTA – The Internet & Television Association

David Casem, CEO and Founder

Telnyx LLC

Glenn Clepper, Director, Regulatory

Charter Communications

Dana Crandall, Distinguished Engineer – Network Engineering & Operations

Verizon Communications

Mark Desterdick, Distinguished MTS, Network Infrastructure Planning

Verizon Communications (Working Group Alternate)

James C. Falvey, Member

Eckert Seamans Cherin & Mellott, LLC

LNP Alliance (Working Group Alternate)

Brian J. Ford, Senior Regulatory Counsel*

NTCA – The Rural Broadband Association

Matthew Gerst, Assistant Vice President, Regulatory

CTIA

Jay Gerstner, Senior Director Advanced Engineering

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Bandwidth.com, Inc. (Working Group Alternate)

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TDS Telecommunications Corporation

Cullen Robbins, IT/Telecom/Communications Analyst

Nebraska Public Service Commission

National Association of Regulatory Utility Commissioners

Greg Rogers, Deputy General Counsel*

Bandwidth.com, Inc.

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Susan Travis, Rate/Financial Analyst

Colorado Public Utilities Commission

Antonio Vickers, Manager, IT Operations and Billing

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Stephanie Wall, Regulatory Compliance Accountant

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John Staurulakis, Inc.

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Special Members (Non-Voting):

Chris Drake, Chief Technology Officer

Telcordia Technologies, Inc. dba iconectiv

Tom McGarry, Neustar Fellow

Appendix C: Flows

Appendix D: Glossary

ACQ	All Call Query
ATIS	Alliance for Telecommunications Industry Solutions
CdPN	Called Party Number
C4	Class 4 Switch
C5	Class 5 Switch
CSCF	Call Session Controller Function
I-CSCF	Interrogating - Call Session Controller Function
P-CSCF	Proxy - Call Session Controller Function
S-CSCF	Serving - Call Session Controller Function
FCC	Federal Communication Commission
HSS	Home subscriber server
IP	Internet Protocol

IPLRN	Internet Protocol Location Routing Number
IP NNI	Internet Protocol Network to Network Interface
ISUP	Integrated Services Digital Network User Part
IXC	Inter Exchange Company
LATA	Local Access and Transport Area
LD	Long Distance
LRN	Location Routing Number
LNP	Local Number Portability
LSMS	Local Service Management System
MSC	Mobile Switching Center
NANC	North American Numbering Council
NGGW	Non-geographic Gateway
NGLRN	Non-geographic Location Routing Number
NLRN	National Location Routing Number
NNP	National Number Portability
NP	Number Portability
NPA	Numbering Plan Area
NPAC	Number Portability Administration Center
NXX	Exchange
RBOC	Regional Bell Operating Company
PSTN	Public Switched Telephone Network
RS	Route Server
SBC	Session Border Controller
SIP	Session Initiation Protocol

SP	Service Provider
SOA	Service Order Administration
SS7	Signaling System 7
TDM	Time-Division Multiplexing
TN	Telephone Number
UAC	User-Agent Client
UAS	User Agent Server
URI	Uniform Resource Identifier
URL	
VoIP	Voice over Internet Protocol

A

All Call Query (ACQ) is the requirement or function of originating service providers querying the called party telephone number in the routing database, on every call to determine LRN

Alliance for Telecommunications Industry Solutions (ATIS) is a standards body where companies in the information and communications technology (ICT) industry come together to address common, critical priorities. ATIS is accredited by the American National Standards Institute (ANSI)

C

Called Party Number (CPN) is a telephone number that has been dialed to reach a destination.

Call Session Controller Function (CSCF) represents a series of SIP servers or proxies, collectively called Call Session Control Function (CSCF), are used to process SIP signaling packets in IP call flows.

Interrogating - Call Session Controller Function (I-CSCF) is a proxies server retrieves information from IMS core elements for purposes of SIP registration and call set up.

Proxy - Call Session Controller Function (P-CSCF) is the first point of contact for the IMS core network. End-user devices connect to the proxy, and it forwards all messaging request to the applicable IMS Core elements registration, security, routing, etc.

Serving - Call Session Controller Function (S-CSCF) is the central node of the signaling plane. It is a SIP server but performs session control too. It is always located in the home network. It interfaces to the HSS to download user profiles and upload user to S-CSCF associations

Class 4 Switch or tandem, telephone switch is a U.S. telephone company central office telephone exchange used to interconnect local exchange carrier offices for long distance communications in the public switched telephone network. It doesn't connect directly to any telephones; instead, it connects to other class-4 switches and to class-5 telephone switches

Class 5 Switch is a telephone switch or telephone exchange in the public switched telephone network located at the local telephone company's central office, directly serving subscribers. Class-5 switch services include basic dial-tone, calling features, and additional digital and data services to subscribers.

F

Federal Communication Commission (FCC) The FCC regulates interstate and international communications by radio, television, wire, satellite and cable in all 50 states, the District of Columbia and U.S. territories. An independent U.S. government agency overseen by Congress, the commission is the United States' primary authority for communications law, regulation and technological innovation.

H

Home Subscriber Server (HSS) is a master user database that supports the IMS network entities that handle calls. It contains the subscription-related information, performs authentication and authorization of the user, and can provide information about the subscriber's location and IP information.

I

Internet Protocol (IP) is a packet-based protocol used to exchange data over computer networks. IP handles addressing, fragmentation, reassembly, and protocol demultiplexing. It is the foundation on which all other IP protocols (collectively referred to as the IP Protocol suite) are built.

Internet Protocol Location Routing Number (IPLRN) is a location routing number that is used to port numbers to and route non-geographically assigned telephone numbers to the IP enabled carriers.

IP Network to Network Interface (IP NNI) is an interface that specifies signaling and management functions between two networks. An NNI circuit can be used for interconnection of signaling (e.g., SS7), Internet Protocol (IP)

Inter Exchange Carrier (IXC) is a telephone company providing connections between local exchanges in different geographic areas. They also provide local access and transport area services as per the Telecommunication Act of 1996. They are commonly referred to as long-distance carriers

Integrated Services Digital Network User Part (ISUP) is part of Signaling System No. 7 (SS7), which is used to set up telephone calls in the public switched telephone network (PSTN). Link to additonal info

L

Local Access Transport Area (LATA) is a geographical area designated as a LATA in the National Exchange Carrier Association. It often defines an area where a Regional Bell Operating Company is permitted to offer exchange telecommunications and exchange access services. Currently, the geographic scope of a local routing number is limited to a LATA, meaning numbers can only be ported within a LATA assignment.

Long Distance (LD) is a telephone call made to a location outside a defined local calling area or those calls that cross LATA boundaries.

Local Routing Number (LRN) is a ten-digit number in a database called a Service Control Point (SCP) that identifies a switch for a local telephone exchange. The assignment of a location routing number to telephone numbers allows for local number portability.

Local Number Portability (LNP) refers to the ability of a "customer of record" of an existing fixed-line, VoIP or mobile telephone number assigned by a carrier to reassign the telephone number to another carrier

Local Service Management System (LSMS) is a system used by a Service Provider which receives data broadcast from the Number Portability Admiration Center (NPAC). The LSMS provisions the service provider's downstream systems, such as its call routing database.

Legacy Wireline Switch (LWS) is a telephone switch or telephone exchange in the public switched telephone network, directly serving subscribers. Also called a Class 5 Switch or TDM switch, an LWS is a computer specialized for TDM-based, circuit-switched telephone calls.

Services include basic dial-tone, calling features, and additional digital and data services to subscribers connected to a local loop.

M

Mobile Switching Center (MSC) is the primary service delivery node for Global System for Mobile Communications (GSM), responsible for routing voice calls and SMS as well as other services. It also enables mobile devices to communicate with other mobile devices and telephones in the Public Switched Telephone Network (PSTN).

N

North American Numbering Council (NANC) is a Federal Advisory Committee that was created to advise the Commission on numbering issues and to make recommendations that foster efficient and impartial number administration.

Non-geographic Gateway (NGGW) are VoIP nodes, that host NGLRNs and provide connectivity to service providers that port in NNP TNs

Non-geographic Location Routing Number (NGLRN) is a model supporting national number portability by establishing a new numbering admiration network gateway function for the assignment and porting of telephone numbers to NGLRN vs. a traditional local routing number.

National Location Routing Number (NLRN) is model supporting national number portability using existing LRNs. The approach allows TNs to be ported beyond the current LATA boundaries, thereby allowing TNs to be made available to customers in any geographic location across the nation.

National Number Portability (NNP) is the ability of users of telecommunications services to retain existing telecommunications numbers without impairment of quality, reliability; or convenience when switching from one telecommunications carrier to another or when moving from one physical location to another.

Number Portability (NP) allows the customer of record to reassign the number to another carrier ("service provider portability"), move it to another location ("geographic portability"), or change the type of service ("service portability").

Numbering Plan Area (NPA) divides territories into Numbering Plan Areas (NPAs), each identified by a three-digit code commonly called area code. The NPA is the first three digits of a ten-digit telephone number (**NPA**)-NXX-XXXX or **303**-372-1000.

Number Portability Administration Center (NPAC) is a database and registry to enable number portability for the United States and Canada. The database contains the data used to

route, rate, and bill telephone calls for telephone numbers that are no longer assigned to the original carrier.3

Exchange (NXX) is the three-digit code that forms the second part of a 10-digit telephone number. The NXX is also known as the "central office code" or "exchange".

P

Public Switch Telephone Network (PSTN) is the aggregate of the world's circuit-switched telephone networks that are operated by national, regional, or local telephony operators, providing infrastructure and services for public telecommunication. The PSTN consists of telephone lines, fiber optic cables, microwave transmission links, cellular networks, communications satellites, and undersea telephone cables, all interconnected by switching centers, thus allowing most telephones to communicate with each other. Originally a network of fixed-line analog telephone systems, the PSTN is now almost entirely digital in its core network and includes mobile and other networks, as well as fixed telephones.

R

Route Server (RS) is an routing server for a SIP network. Route Server can be deployed as a routing server for Local Number Portability dips.

S

Session Border Controller (SBC) is a network element deployed to protect SIP based Voice over Internet Protocol (VoIP) networks. The functions include security, connectivity between networks, quality of services policy, and media (voice, video, and other) services.

Session Initiation Protocol (SIP) is a signaling protocol used for initiating, maintaining, modifying and terminating real-time sessions that involve video, voice, messaging and other communications applications and services between two or more endpoints on IP networks.

Service Provider (SP) is a company that has traditionally provided telephone and similar services allowing users to send and receive telephone calls and faxes

Service Order Administration (SOA) is a hosted or managed service that automates the process of updating the Number Portability Administration Center (NPAC) during the number porting process.

Signaling System 7 (SS7) is an architecture for performing out-of-band signaling in support of the call-establishment, billing, routing, and information exchange functions of the public switched telephone network (PSTN). Link to Wikipedia

T

Time-Division Multiplexing (TDM) is a method of putting multiple data streams in a single signal by separating the signal into many segments, each having a very short duration. Each individual data stream is reassembled at the receiving end based on the timing.

Telephone Number (TN) is a sequence of digits assigned to a fixed-line telephone subscriber station connected to a telephone line or to a wireless electronic telephony device, such as a radio telephone or a mobile telephone, or to other devices for data transmission via the public switched telephone network (PSTN) or other public and private networks.

U

User Agent (UA) collectively the **User Agent Client** (UAC) and **User Agent Server** (UAS) is used to establish connections and enable sessions between users and the IMS network.

Uniform Resource Identifier (URI) is a string of characters that unambiguously identifies a logical or physical resource on a network, of which the best-known type is the web address or URL.

V

Voice over Internet Protocol (VoIP), also called IP telephony, is a methodology and group of technologies for the delivery of voice communications and multimedia sessions over Internet Protocol (IP) networks

North American Numbering Council

Nationwide Number Portability Issues Working Group

Minority Report[8]

I wish to congratulate the members of the technical sub-working group for their efforts under extremely difficult circumstances. The challenges they face were not of their own making but reflected difficult time lines and challenging policy and economic choices that were beyond the scope of the referral made to the NANC by the Wireline Competition Bureau.

Regretfully I cannot support the report for the principal reason that includes references to IP-LRN (formally NG-LRN) which, in my opinion, should not have been included for consideration as a possible technical solution to the National Number Portability issue.

In my judgment the working group should have focused its limited resources on the N-LRN solution as the only viable option.

In the previous report to the NANC we rejected out of hand the GR-2982 Core (GUBB) solution as in appropriate since it relied on modification to SS7 to implement. It has been apparent for years that SS7 or the entire TDM network architecture cannot and should not be modified as we continue down the road of the all IP Transition of the Voice Communications network of the United States.

The principal issue in IP-LRN's is to facilitate interconnected SIP/IMS networks and tangentially proports to solve the problem of National Number Portability. IP-LRN's are attempting to solve a business model problem for IP centric service providers that should properly be addressed in the Technology Transitions proceeding which has been ongoing for many years now.

The issue of how to facilitate all IP Interconnection for Real Time Voice Communications using NANP numbering has been understood for nearly 20 years and has been well documented. I have been directly involved in many of those efforts.

I would point out several relevant items.

First. For nearly 9 years I was the co-chair of the IETF ENUM working group that produced RFC 6116. ENUM relies on the use of Domain Name System (DNS) technology to perform a number to URI translations. This technology is in use today and is the basis of the ITRS database maintained by the FCC to facilitate the Telephone Relay Service and may be used to help

[8] Richard Shockey, SIP Forum

facilitate Video Relay services in the future. ENUM works, it's fast, highly saleable though it does have some shortcomings that I will not elaborate on here.

Second. The NANC many years approved a variety of URI fields in the NPAC that could be used for phone number to URI translations at a service layer granularity. Voice Video Text etc. These are collectively the NANC 400 fields. I was directly involved in the design of those fields. Since the introduction of those fields. Not one service provider in the United States has ever provisioned a single NANC 400 NPAC field.

Third. ATIS and the SIP Forum Network to Network TF tried to deliver to the industry a consensus report on IP interconnection and we concluded there was NO CONSENSUS. ENUM was studied as an option. For now, the elements of the industry are satisfied with negotiated bi-lateral agreements. This may have to change in the future but IP-LRN's are not the optimal technical solution.[9]

Fourth. It should be pointed out that the Commission has steadfastly refused to classify Interconnected VoIP as a Title II service. The Commission has used its plenary numbering authority under Section 252(e) 1 of the Act to impose mandatory 911 and LNP obligations on VoIP service providers. In my judgement the Commission would have to revisit that decision if it choose to take the IP-LRN solution seriously.

Fifth. The IP-LRN proposal has been significantly modified from its original NG-LRN form that would have potentially mandated IP Gateways in every rate center and LATA's. The Commission has been trying to nudge the industry away from rate centers and LATA's but as the Intercarrier Compensation reform effort proved there is still significant resistance to that effort.

Other Consideration

The Technical subcommittee correctly concluded that there are several issues beyond the scope of the technical working group that will have to be considered if there is to be progress on implementing National Number Portability.

First. It is not clear to me Commission is prepared to address the forest of issues surrounding ratings and tariffs especially on the problem of Originating Access charges. I have serious doubts NNP can proceed without forcefully addressing this challenge.

Second. It is not clear whether IP-NNP or a national system of IP Interconnection will require service providers, especially smaller rural carriers would be forced into accepting the burden of Bi-Directional transport costs to new all IP points of interconnection.

Third. It is not entirely clear whether NNP requires the imposition of National 10 Digit Dialing which would have not just economic impacts but political impacts on states that still permit 7-

[9] https://www.sipforum.org/download/joint-atissip-forum-technical-report-ip-interconnection-routing-atis-1000062-sipforum_twg-6/?wpdmdl=2780

digit local dialing such as Montana, North Dakota South Dakota, Maine, Vermont, Delaware, Alaska etc.

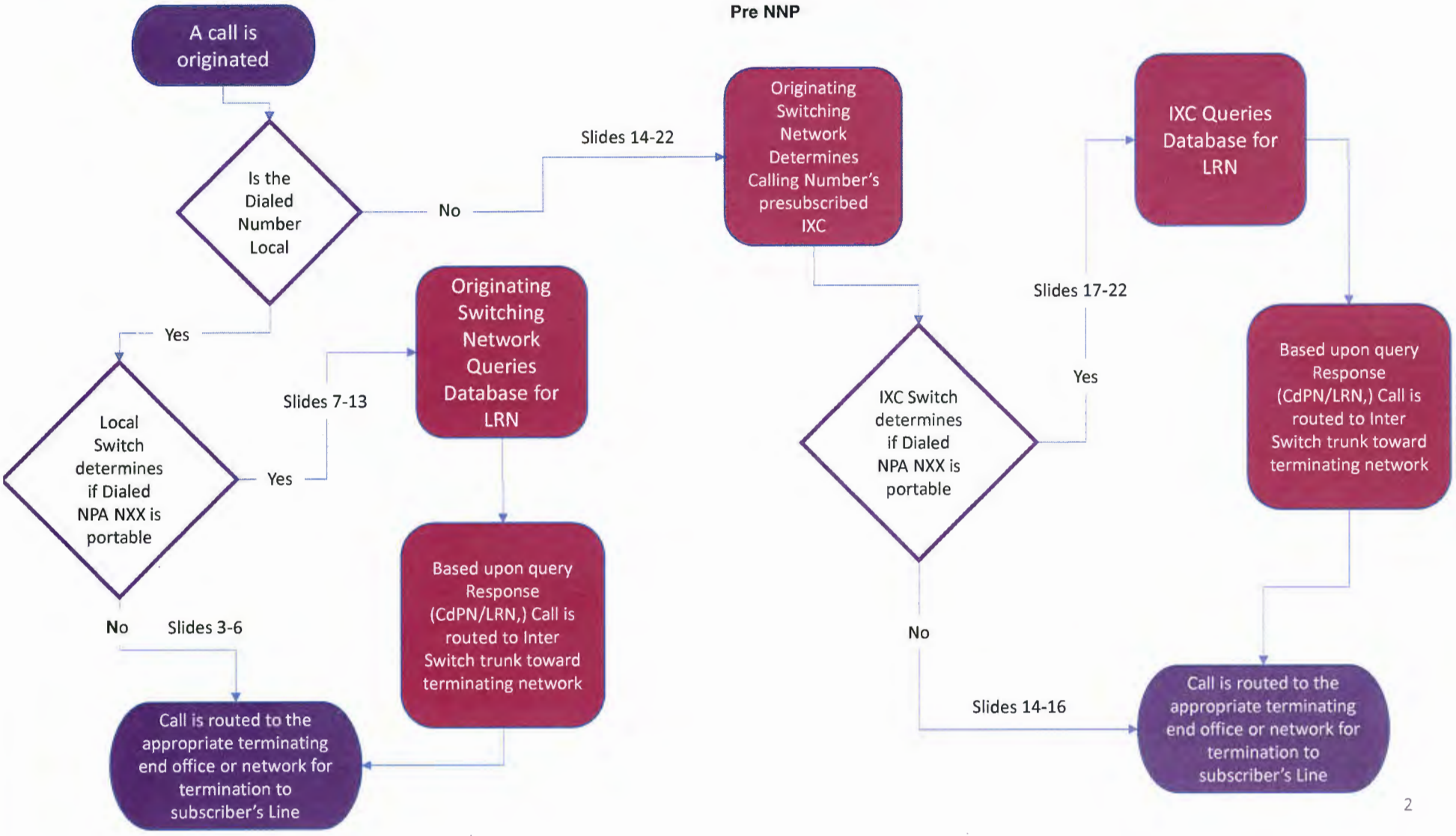
Fourth. The economic impact of All Call Query on smaller service providers is not well understood. Especially the significant costs of equipment upgrade to enable a localized full cache of the NPAC which NNP would probably require. This is an industry with very, very thin margins and some networks are more advanced than others.

This begs the question raised in the NNP WG of whether it is technically feasible to permit some elements of the industry to enable NNP and establish a timeline for others to follow.

Some observers have noted that the impending STIR/SHAKEN Call Authentication Mandate outlined by Chairman Pai and now pending before Congress may result in a mandate to all IP interconnection since the Call Authentication data can only survive carrier to carrier if the call signaling remains SIP/IMS in the call path. There is merit to this argument. Only time will tell if this is the case. It should be noted that STIR/SHAKEN imposes real and significant costs to the industry. In any event the combination of STIR/SHAKEN and NNP and all IP Interconnection may be a "Bridge to Far" for the industry.

Conclusion

It is my personal recommendation that the Wireline Competition Bureau reject any further consideration of IP or NG LRN's and concentrate on the NLRN option taking into consideration that there are significant economic impacts that are still not well understood.


Pre NNP
A call is originated
Is the Dialed Number Local
No
Slides 14-22
Originating Switching Network Determines Calling Number's presubscribed IXC
IXC Queries Database for LRN
Slides 17-22
Yes
Local Switch determines if Dialed NPA NXX is portable
Yes
Slides 7-13
Originating Switching Network Queries Database for LRN
IXC Switch determines if Dialed NPA NXX is portable
Yes
Based upon query Response (CdPN/LRN,) Call is routed to Inter Switch trunk toward terminating network
No
Slides 3-6
Based upon query Response (CdPN/LRN,) Call is routed to Inter Switch trunk toward terminating network
No
Slides 14-16
Call is routed to the appropriate terminating end office or network for termination to subscriber's Line
Call is routed to the appropriate terminating end office or network for termination to subscriber's Line